Remarks

The Applicants have amended Claims 2 and 4 to recite that martensite in the weld heat affected zone of the steel pipe is substantially free of Cr depleted zones. Support may be found throughout the Applicants' specification such as in paragraph [0018], for example.

Claim 16 has been cancelled.

Entry of the above amendments, cancellation and addition into the official file is respectfully requested.

The Applicants note with appreciation the withdrawal of various of the previous rejections. Thus, three rejections remain as discussed below.

Claim 16 stands rejected under 35 USC §112 as being indefinite inasmuch as it depends from a cancelled claim. The Applicants have cancelled Claim 16, thereby rendering that rejection moot.

Claims 2 – 5, 7 – 10 and 12 – 20 stand rejected under 35 USC §103 over Kimura. The Applicants respectfully submit that the rejection is now moot with respect to cancelled Claim 16. The Applicants also respectfully submit that Kimura fails to disclose, teach or suggest the subject matter of rejected Claims 2 – 5, 7 – 10, 12 – 15 and 17 – 20. Reasons are set forth below.

As noted above, Claims 2 and 4 recite that martensite in the weld heat affected zone of the steel pipe is substantially free of Cr depleted zones. The Applicants respectfully submit that Kimura fails to disclose that discovery by the Applicants. In that regard, the Applicants discovered that Cr carbides precipitates at prior-austenite grain boundaries during and following welding thermocycles which causes such Cr depleted zones around the prior-austenite grain boundaries. This results in undesirable cracking. The Applicants discovered that preventing Cr carbides from being formed at the prior-austenite grain boundaries prevents the formation of Cr

depleted zones in the resulting martensite and this reduces the incidence of cracking. The Applicants respectfully submit that Kimura does not disclose, teach or suggest the problem, much less the solution as recited in the Applicants' Claims 2 and 4. Specifically, the Applicants cause the martensite in the steel pipe to be substantially free of Cr depleted zones. This results in a crack-free steel pipe.

This is achieved through a combination of compositional elements and by the way in which the steels are made. This is important because Kimura fails to disclose, teach or suggest that combination of factors that results in the Applicants' steel pipes containing martensite that is substantially free of Cr depleted zones.

Kimura beginning at col. 5 at line 36 provides very limited disclosure with respect to the manner in which the steels are made. Col. 5 recites that the steels are cast and formed into a seamless steel pipe by a plug mill or a mandrel mill and then annealed according to demand to finish the product. In other words, there may or may not be annealing. Then, at the top of col. 6, Kimura provides a number of examples wherein steel slabs were hot rolled and then austenized and tempered to x80 grade strength.

However, this is the limit of the disclosure of how the Kimura steels are made and does not include, for example, the Applicants' typical quench tempering step, among others, that the steels are subjected to in the Applicants' methodology. As a consequence, one skilled in the art would not be motivated to make modifications as to compositional elements or methodology to cause martensite in the weld heat affected zone of the steel pipes to be substantially free of Cr depleted zones. It therefore inherently follows that one skilled in the art would not have a reasonable expectation of success in achieving such substantial freedom of Cr depleted zones because there simply is no recognition of this claimed aspect in the first place. In other words,

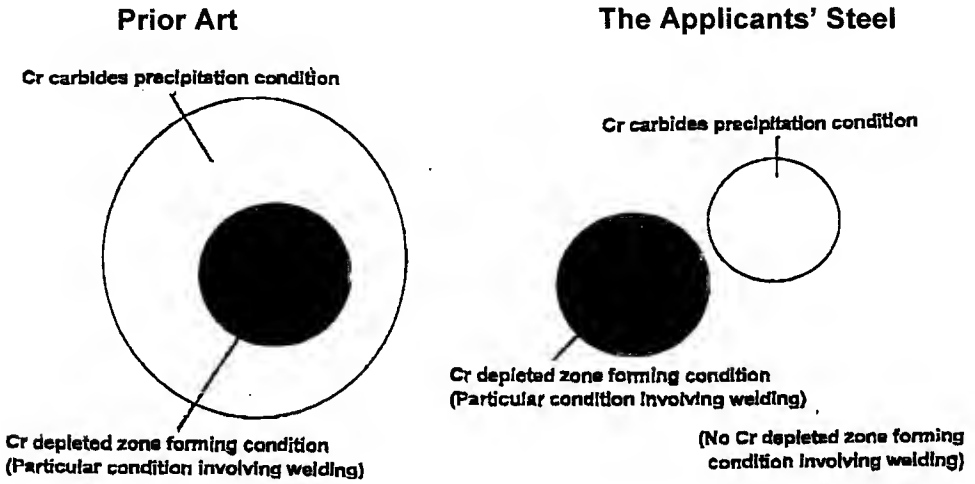
one can hardly be expected to "optimize" elements or methodology when one skilled in the art does not even recognize the problem, much less the solution. Also, because a portion wherein the Cr depleted zone, which is a problem confronted in the prior art such as Kimura, is a heat-affected zone, whether or not a Cr depleted zone is formed in a martensitic structure in the heat-affected zone causes the difference over Kimura.

According to Claims 2 and 4, the pink region representing a Cr depleted zone in the following conceptual diagram is not formed by controlling the content C_{sol} defined by equation (1) to less than 0.0050%. A Cr depleted zone according to the prior art such as Kimura is formed only when received welding thermal cycles under a particular condition, among Cr carbides precipitation conditions, whereas, with the Applicants' Claims 2 and 4, the content C_{sol} defined by equation (1) is controlled to less than 0.0050% so that the range of Cr carbides precipitation condition is narrowed to suppress the precipitation of Cr carbides whereby the Cr depleted zone is not formed even in the particular condition of a welding thermal cycle. In other words, in Claims 2 and 4, the Cr carbides precipitation condition and the Cr depleted zone forming condition do not overlap.

Therefore, as set forth in paragraph [0011] of the Applicants' specification, "It is known that stress corrosion cracking caused by such a mechanism occurs in austenitic stainless steel but it is not presumed that the cracking occurs in martensitic stainless steel. The Cr depleted zones were considered not to be formed in the martensitic stainless steel since the diffusion rate of Cr in a martensitic microstructure is extremely greater than that in an austenitic microstructure and Cr is therefore constantly supplemented even if Cr carbide is formed. However, the inventors found that the Cr depleted zones are formed even in the martensitic stainless steel under specific welding conditions and IGSCC occurs in a mild corrosion environment." As a demonstration of

the foregoing, all of the Examples of Kimura are outside the range of Claims 2 and 4 in terms of N level and equation (1).

It is understood from the above that there is obtained, according to Claims 2 and 4, an unexpected effect of suppressing intergranular stress corrosion cracking (IGSCC) even in martensitic stainless steel, which has not been disclosed in Kimura.



The Applicants accordingly respectfully submit that Kimura is inapplicable to Claims 2 – 5, 7 – 10, 12 – 15 and 17 – 20. Withdrawal of the rejection is respectfully requested.

Claims 2 – 5, 7 – 10 and 12 – 20 stand provisionally rejected on the grounds of non-statutory obviousness type double patenting over Claims 1 – 4 and 12 – 16 of co-pending Application No. 12/416,996. The Applicants respectfully submit that the rejection is now moot with respect to cancelled Claim 16. Also, the Applicants respectfully submit that this rejection need not be addressed at this time inasmuch as the rejection is provisional. Moreover, in the event that claims are found allowable in this earlier-filed application, a following non-statutory obviousness type double-patenting rejection could theoretically be applied in the later filed co-pending Application No. 12/416,996. Thus, the Applicants respectfully request that further

treatment of this rejection be held in abeyance pending withdrawal of the other rejection of the claims.

In light of the foregoing, the Applicants respectfully submit that the entire application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,

T. Daniel Christenbury
Reg. No. 31,750
Attorney for Applicants

TDC/sh
(215) 656-3381